METHOD FOR ALLOWING CD REMOVAL WHEN BOOTING EMBEDDED OS FROM A CD-ROM DEVICE

Andrew W. Wilks

Richard R. Lee

5

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to computer systems. More specifically, the present invention relates to enabling removal of a removable medium of a boot device included in a

10 computer system when booting an embedded operating system from a read only media.

Description of the Related Art

Personal computer ("PC") systems in general and IBM compatible computer systems in particular have attained widespread use. These computer systems handle information and primarily give independent computing power to a single user (or a relatively small group of

15 users in the case of a PC network). Such computer systems are generally inexpensively priced for purchase by individuals or small businesses and provide computing power to many segments of today's modern society.

A computer system can usually be defined as a desktop, floor-standing, or portable microcomputer that includes a system unit having a central processing unit ("processor"),

20 volatile and/or non-volatile memory, a display monitor, a keyboard, one or more floppy diskette drives, a hard disk storage device, an optional DVD or CD-ROM drive, and an optional printer. A computer system typically includes an operating system ("OS"), such as Microsoft Windows NT™, NetWare® or Linux. A computer system may also include one or a plurality of peripheral devices such as input/output ("I/O") devices coupled to the system

25 processor to perform specialized functions. Examples of I/O devices include keyboard

-1-

interfaces with keyboard controllers, floppy diskette drive controllers, modems, sound and video devices, specialized communication devices, and even other computer systems communicating with each other via a network. These I/O devices are typically plugged into connectors of computer system I/O interfaces such as serial interfaces and parallel interfaces,

5   for example. Generally, these computer systems use a system board or motherboard to electrically interconnect these devices.

Computer systems also typically include basic input/output system ("BIOS") programs to ease programmer/user interaction with the computer system devices. More specifically, BIOS provides a software interface between the system hardware and the

10   operating system/application program.

Although the processor provides the "kernel" of the computer system, I/O communication between an I/O device and the processor provides a basic feature of computer systems. Many I/O devices include specialized hardware working in conjunction with OS specific device drivers and BIOS routines, e.g., CD-ROM BIOS, to perform functions such as

15   information transfer between the processor and external devices, such as modems and printers, coupled to I/O devices.

Computer system manufacturers may typically load the preferred operating system before shipping the computer system to the customer. Some customers may prefer to modify the loaded operating system or purchase and load their own preferred operating system. To

20   load the selected operating system onto the hard disk for the first time or to change the preferred operating system, the PC user typically uses a boot device to initially boot up the computer system. A boot device may typically include a removable media such as a floppy disk or a CD-ROM. For example, a bootable CD-ROM compliant with the "El Torito" specification (described below) may be used to boot the computer system. The boot CD-

25   ROM typically includes a boot sector, which includes a system image of the boot operating system. The boot floppy disk or the boot CD-ROM may also include a utility to install a preferred operating system on to the hard disk drive. Each type of operating system selected, e.g., Windows ME™, Windows 2000™ or Linux, may have its own CD. Bootable CD's are available for Windows NT, Windows 2000™, Windows XP or Linux.

-2-

The El Torito Bootable CD-ROM Format Specification, Version 1.0, January 15, 1995, Curtis E. Stevens, Phoenix Technologies and Stan Merkin, IBM Corporation, supports a floppy disk emulation format, a hard disk emulation format or a "no emulation" for the CD boot image. When the CD boot image is in a floppy disk emulation format, the CD becomes drive 00, the former drive 00 moves to 01 and all other drive identifiers remain intact. This means that the computer system always has a usable floppy drive. All hard disk drive letters are maintained so that a CD can boot and then install software on the hard disk. The floppy remains accessible as drive 01 to allow software updates via supplemental floppies. When the CD boot image is in a hard disk emulation format, all drives numbered 80 and above are incremented by 1. The CD will become drive 80. This allows software vendors to create stand-alone CD's, without regard to the hard disk drives. The computer systems hard drive remains accessible because the stand alone CD may need temporary disk storage. When the CD boot image is simply a loader or stand alone program and no emulation is desired then the drive numbers will be unaffected after the boot image is loaded.

U.S. Patent Number 6,279,109 issued August 21, 2001, "Computing System And Operating Method For Booting And Running A Graphical User Interface (GUI) With R/W Hard Drive Partition Unavailable", Michael Brundridge, describes a system and a method of booting and executing a graphical user interface with R/W hard drive partition unavailable. The application describes using the CD boot image in a floppy disk emulation format, as described in the El Torito specification. The application also describes creating a RAM disk using a MS-DOS floppy image, and a Win95 image stored on the ISO 9660 track of the boot CD in zip file format. The size of the RAM disk is fixed.

Traditionally, a CD boot image in a hard disk emulation format is used to provide a large MS-DOS compatible storage space for application programs. This it typically most suitable for stand alone applications which do not require full system resources. Booting the CD as a hard disk normally requires that all applications on the CD are MS-DOS based.

A backing store is a storage medium, such as a disk or memory. When the CD is booted in a hard disk emulation format, the boot device media, e.g., the CD-ROM, is typically used as the backing store. This results in locking up the boot media, e.g., the CD-ROM, so as to provide protection against the occurrences of memory page faults. When the

-3-